

# PATENT SPECIFICATION

Inventor: JACK ISAAC WINICK



794,138

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International Classification: —A47c.

## COMPLETE SPECIFICATION Improvements in or relating to Reclining Chairs

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### ERRATA

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SPECIFICATION No. 794,138

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Page 3, line 8, after "in" insert "any of"  
Page 2, line 80, after "any" insert "desired"  
Page 5, line 71, after "5" insert ","

THE PATENT OFFICE,  
23rd June, 1958.

25 connection thereof to the seat being such that rearward tilting of the back produces a forward movement of the seat and also a downward movement of the rear end of the seat relative to the chair frame, at least one of said seat and back components having a pin and slot connection with the chair frame structure operable to determine the relative degrees of tilting movement of the seat and back components and, under the weight of the occupant, to provide frictional resistance to movement of said components, to retain them in any desired position of adjustment.

Reference will now be made to the accompanying drawings which illustrate several embodiments of the invention and wherein:—

Fig. 1 is a sectional view of one embodiment of the chair structure prior to upholstering and showing the seat in the fully lowered position,

Fig. 2 is a fragmentary view showing the roller and slot mechanism when the seat is in the raised position,

tion, said strip being hingeably connected at its lower end by a pivot pin 6 to the rear end of a second metal strip 7 secured to the seat side rail 3. The pivot pin 6 projects laterally and rides in an inclined slot 8 formed in a metal plate 9 secured to the fixed chair frame. At a point spaced from the pin 6, the strip 5 carries a second pin 10 which rides in a vertical slot 11 also formed in the plate 9 and preferably continuous with the slot 8. With the chair back in the erect position and the seat fully lowered, the pins are located at the upper ends of the respective slots as shown in Fig. 1 and thus, when the back is tilted rearwardly, it pivots around the pin 10 but, due to the inclination of the slot 8, there is also produced a downward movement of the chair back, the pins riding down their slots towards the position shown in Fig. 2. By reason of the hinged connection, therefore, there is also produced a downward and forward movement of the rear end of the chair seat and, to secure the desired tilting

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# PATENT SPECIFICATION

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Application Date Feb. 22, 1956.

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Complete Specification Published April 30, 1958.

Index at Acceptance:—Class 52(2), J11.

International Classification: —A47c.

## COMPLETE SPECIFICATION

### Improvements in or relating to Reclining Chairs

We, RESEARCH INTERESTS LIMITED, a British Company, of 79, Davies Street, London, W.1, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to reclining chairs embodying a tilting back and a tilting seat interconnected in a manner such that the front end of the seat rises automatically as the back is tilted rearwardly, and in which the said seat and back can be caused to stay in any desired intermediate position of adjustment within the limits of the tilting mechanism, and the object of the present invention is to provide an improved chair of this character.

According to the invention the improved reclining chair comprises a chair back component supported for tilting movement in a chair frame structure and hingedly connected adjacent its lower end to a seat component also supported for tilting movement in said frame structure, the mounting of the back and the connection thereof to the seat being such that rearward tilting of the back produces a forward movement of the seat and also a downward movement of the rear end of the seat relative to the chair frame, at least one of said seat and back components having a pin and slot connection with the chair frame structure operable to determine the relative degrees of tilting movement of the seat and back components and, under the weight of the occupant, to provide frictional resistance to movement of said components, to retain them in any desired position of adjustment.

Reference will now be made to the accompanying drawings which illustrate several embodiments of the invention and wherein:—

Fig. 1 is a sectional view of one embodiment of the chair structure prior to upholstering and showing the seat in the fully lowered position,

Fig. 2 is a fragmentary view showing the roller and slot mechanism when the seat is in the raised position,

Fig. 3 is a cross section on the line III—III of Fig. 1,

Fig. 4 is a sectional view showing various modifications which can be made to the structure shown in Figs. 1—3,

Fig. 5 is a view similar to Fig. 1 but showing a further embodiment,

Fig. 6 is a cross section on the line VI—VI of Fig. 5, and

Fig. 7 is a fragmentary end view as seen in the direction of the arrow on Fig. 5.

It is to be understood that the mechanism shown in the drawings is in practice duplicated, one set being provided at each side of the chair, but as the two mechanisms are similar only one set will need to be described and illustrated. Referring first to Figs. 1—3, the side frame structure of the chair is indicated generally at 1 and includes a fixed side rail 2, the side rail of the seat structure being indicated at 3 and the side frame member of the movable chair back at 4. As shown, attached to the back frame member 4 adjacent its lower end is a metal strip 5, preferably of angle section, said strip being hingedly connected at its lower end by a pivot pin 6 to the rear end of a second metal strip 7 secured to the seat side rail 3. The pivot pin 6 projects laterally and rides in an inclined slot 8 formed in a metal plate 9 secured to the fixed chair frame. At a point spaced from the pin 6, the strip 5 carries a second pin 10 which rides in a vertical slot 11 also formed in the plate 9 and preferably continuous with the slot 8. With the chair back in the erect position and the seat fully lowered, the pins are located at the upper ends of the respective slots as shown in Fig. 1 and thus,

when the back is tilted rearwardly, it pivots around the pin 10 but, due to the inclination of the slot 8, there is also produced a downward movement of the chair back, the pins riding down their slots towards the position shown in Fig. 2. By reason of the hinged connection, therefore, there is also produced a downward and forward movement of the rear end of the chair seat and, to secure the desired tilting

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movement of the seat, means are provided which utilise this forward movement to effect a rising of the front end of the seat. One such means consists of a further pin 12 carried by 5 the metal strip 7 and riding in an inclined slot 13 formed in a plate 14 secured to the fixed side rail 2.

It will be seen that with the arrangement described, the relative angular movements of 10 the back and the seat are dependent upon the spacing of the pins 6 and 10 and of the pins 6 and 12 and also upon the angle of inclination of the slot 8, and by appropriate selection of these factors it is possible to secure any desired 15 relative movement of the seat and back. In practice, very satisfactory results have been obtained where the pins 6 and 10 are spaced approximately 3 inches apart, the pins 6 and 12 are spaced approximately  $6\frac{1}{2}$  inches apart 20 and the slot 8 is inclined at about  $45^\circ$  to the horizontal. The degree of lift at the front end of the seat is also determined by the angle of the slot 13.

It will be observed that when the chair is in 25 a reclining position, the weight of an occupant causes the pins 6 and 10 to exert a thrust against the rear walls of their respective slots 8, 11 and, where the pin and slot device 12, 13 is used, the pin 12 exerts a similar thrust 30 against the lower wall of the associated slot 13. Thus there is created by the weight of the occupant a considerable frictional resistance to movement of the seat and back and this frictional resistance is sufficient to retain the seat 35 and back in any desired intermediate position of tilt thus obviating the need for special frictional or other locking devices. Where, however, the frictional resistance of the pin to movement is excessive such as to necessitate undue effort to adjust the seat and back, rollers 40 may be fitted over the pins 6, 10 and 12 as indicated at 6a, 10a and 12a to reduce the friction.

It will be seen from the drawings that 45 substantially the whole of the tilt control mechanism is contained within the depth of the seat member and the thickness of the back member thus leaving the space clear beneath the seat. As a further aid to hiding the mechanism, the chair seat is of such width as to have a relatively close fit between the fixed side rails and to permit this the following method of 50 mounting the seat and the roller and slot mechanism 12, 13, 14 is employed. The strip 7 is of angle section and one web thereof is received and secured within a longitudinal groove 16 55 cut in the under edge of the seat rail 3 whilst the other web bears against said under edge. The plate 14 is relatively thin or it may be recessed into the fixed side rail 2 as shown and is formed with a flange or wall 14a defining the slot 13 and providing an enlarged bearing surface for the roller 12a. A spacer 17 is interposed between the roller and the strip 7, the rail 3 being cut away locally as indicated at 18

to clear the pin 12 and the spacer 17, whilst a head 19 on the free end of the pin retains the roller against displacement. Thus the roller and slot mechanism does not necessitate any additional clearance between the seat and the chair frame. The method of constructing and mounting the plate 9 may be similar to that of the plate 14 if desired. 70

With the construction as above described it is possible to co-relate the movements of the chair back and chair seat in such manner as to 75 secure a balanced distribution of the weight thereon in all positions, the frictional loading of the pin, or roller, and slot devices being sufficient to hold the seat and back in any intermediate position. Movement of the seat and back is limited by abutment of one or more of the pins 6, 10, 12 with the ends of the respective slots 8, 11, 13 thus obviating the need for stops in the chair frame structure 80 whereby the mechanism forms a complete entity which functions without the co-operation of any other chair components. 85

The basic structure as above described is 90 capable of several modifications as will now be described with reference to Fig. 4. As shown, the slots 8, 11 and 13 may be formed in a common plate 20 and, if desired, the slotted plates at opposite sides of the chair may be rigidly interconnected, for example, by cross webs 21 secured to or formed integral with the plates, thereby forming a one-piece unit which facilitates installation in a chair frame. 95

The invention is also applicable to all-metal 100 chairs or chairs having a metal frame. In these instances, the plate 20 may constitute part of the metal side frame indicated in broken lines at 22, that is, the slots 8, 11 and 13 are formed directly in the side frame member, which member embodies or is provided with legs 23 or equivalent supporting means. 105

Figs. 5 and 6 illustrate a second and more simplified embodiment of the invention. In this construction, the metal strip 5 on the back frame member 4 has attached to its lower end by welding, rivetting or the like a substantially triangular plate 24, said plate at its upper forward end being pivotally mounted on a pin 25 carried by a plate 26 which is secured to the 110 rear end of the fixed side rail 2. Thus the chair back when tilted rearwardly swings about the pivot 25. The strip 5 may be secured by screws or equivalent means to the outer face of the frame member 4. The plate 24 carries at its 115 lower corner, that is at a point spaced below and rearward of the pivot 25, a pin 27 to which is pivotally attached the rear end of an angle section metal strip 28 adapted to be secured to the seat side rail 3. The strip 28 extends substantially horizontally when the seat is in the fully lowered position and thus it will be seen that, due to the relative disposition of the pivot pins 25 and 27, a rearward tilting movement of the chair back produces a forward 120 125 130

movement of the chair seat. The means for raising the front end of the seat consists of a pin 29 projecting laterally from the strip 28 at a point spaced from the rear end of the seat and which pin rides in an inclined slot 30 formed in a plate 31 secured to the fixed side rail 2.

Thus it will be seen that the relative angular movements of the back and the seat are dependent upon the relative disposition of the pivot pins 25 and 27, the spacing of the pin 29 from the pivot pin 27 and the inclination of the slot 30, and by appropriate selections of these factors it is possible to secure a relatively wide range of relative seat and back movements. Moreover, as in the form previously described, the thrust of the pin 29 against the wall of the slot 30 under the weight of an occupant of the chair creates sufficient frictional resistance to movement to retain the seat in any desired intermediate position of tilt, whilst the pivot pin 25 and pin and slot device 29, 30 constitute the supporting means for the seat and back and obviate the need of stops on the chair frame. Here also, the pin is preferably fitted with a roller, as indicated at 32.

The method of mounting the seat and the pin and slot mechanism is similar to that shown in Figs. 1-3, the vertical web of the metal strip 28 being received in a longitudinal groove 16 in the under edge of the seat rail 3 and carrying the pin 29 on which is supported the spacer 17 and roller 32, the latter riding in the slot 30 which is defined by a flanged portion 31a of the plate 31 recessed into the frame side rail 2.

What we claim is:—

1. A reclining chair comprising a back component supported for tilting movement in a chair frame structure and hingedly connected adjacent its lower end to a seat component also supported for tilting movement in said frame structure, the mounting of the back and the connection thereof to the seat being such that rearward tilting of the back produces a forward movement of the seat and also a downward movement of the rear end of the seat relative to the chair frame, at least one of said seat and back components having a pin and slot connection with the chair frame structure operable to determine the relative degrees of tilting movement of the seat and back components and, under the weight of the occupant, to provide frictional resistance to movement of said components, to retain them in any desired position of adjustment.
2. A reclining chair as claimed in Claim 1, wherein laterally projecting pins are provided at the point of hinged connection of the seat and back and on the back at a point spaced from said connection, the pins riding respectively in inclined and substantially vertical slots formed in the chair frame structure such that rearward tilting movement of the back also produces a forward and downward dis-

placement of its lower end and of the rear end of the seat.

3. A reclining chair as claimed in Claim 1, wherein the chair back is pivotally supported at or adjacent its lower edge on the chair frame structure and, at a point spaced below and rearward of the supporting pivot, has a hinged connection with the rear end of the seat structure whereby rearward tilting movement of the back produces the forward and downward displacement of the rear end of the seat.
4. A reclining chair as claimed in Claim 3, wherein the supporting means for the chair back consists of a plate attached to its lower end and projecting forwardly and downwardly therefrom, said plate being pivotally attached at its upper forward end to the chair frame structure and at its lower rearward end to the seat structure.
5. A reclining chair as claimed in any of Claims 1-4, wherein the means for lifting the front end of the seat consists of a pin projecting laterally from the seat structure at a point spaced from the rear end thereof and adapted to ride in a slot formed in the chair frame structure.
6. A reclining chair as claimed in any of Claims 1-5, wherein metal strips are attached to the side edges of each of the seat and back structures, said strips being pivotally interconnected at adjacently disposed ends to provide the hinge connection between the seat and back and said strips also carrying the pins which engage the slots in the chair frame structure.
7. A reclining chair as claimed in any of Claims 1-6, wherein any or all of said pins where they engage in their respective slots are fitted with rollers.
8. A reclining chair as claimed in Claims 1-7, wherein the pins or their rollers engage slotted plates having flanged portions which define the slots and are recessed into the chair frame structure, said flanged portions providing enlarged bearing surfaces for the pins or rollers.
9. A reclining chair as claimed in any of Claims 5-8, wherein the metal strips fixed to the seat structure are of angle section and each is mounted beneath the lower edge of a side rail of said seat structure with one web received within a longitudinal groove formed in said lower edge, the pin carried by the strip projecting laterally from said web and the seat rail being cut away locally to clear the pin.
10. A reclining chair as claimed in any of Claims 2 and 5-9, wherein the slots for the several pins at one side of the chair are formed in a common plate adapted to be fixed to the chair frame structure.
11. A reclining chair as claimed in Claim 10, wherein the slotted plates at opposite sides of the chair are rigidly interconnected to form a unitary structure.
12. A reclining chair as claimed in any of Claims 2 and 5-9 and having a metal frame

structure, wherein the slots for the pins are formed directly in said frame structure.

13. A reclining chair as claimed in any of Claims 1—12, wherein substantially the whole of the tilting control mechanism is contained within the depth of the seat structure and the thickness of the back structure so as to be concealed thereby.

14. A reclining chair as claimed in any of Claims 1—13, wherein the ends of the slots, by

5 abutment of the pins, act as stops to limit movement of the seat and back.

15. A reclining chair constructed substantially as herein described and according to any of the embodiments illustrated in the accompanying drawings. 15

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PROVISIONAL SPECIFICATION  
No. 36547, A.D. 1955.

Improvements in or relating to Reclining Chairs

We, RESEARCH INTERESTS LIMITED, a British Company, of 79, Davies Street, London, W.1, do hereby declare this invention to be described in the following statement:—

This invention relates to reclining chairs in which a tilting back and a tilting seat are interconnected in a manner such that the front end of the seat rises automatically as the back is tilted rearwardly.

Heretofore, in chairs of this kind, relatively complicated linkage has been used to secure the required relative movement of the seat and back, which linkage was not only relatively costly but was usually visible beneath the seat and was thus detrimental to the appearance of the chair. The object of the present invention is to provide an improved and simplified action or mechanism which avoids the defects above mentioned and which can be constructed to provide any desired relationship between the tilting movements of the seat and the back within the limits of the mechanism.

According to the invention the chair back is pivotally connected at its lower edge to the rear edge of the chair seat and said seat and back each have at each side pin or roller and slot connections at two spaced points with a supporting plate fixed on the chair frame, one of said pins or rollers being common to the seat and the back and being located at the point of pivotal connection of said seat and back and the slots in the supporting plates being so shaped and disposed as to provide the desired angular relationship of the seat and back during tilting movement.

The invention will be more fully understood from the following description of a preferred embodiment. The supporting and guiding mechanism at each side of the chair are similar so that only one need be described. Attached to the chair seat and back respectively adjacent their side edges are two metal strips which are interconnected by a pivot pin at a point adjacent the lower edge of the chair back and the rear edge of the chair seat, this pivot forming a hinge connection between these two members. The pivot pin projects laterally and carries a roller, a second similar roller

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being mounted on the chair back strip at a point spaced from the hinge pivot and a third roller being mounted on the chair seat strip also spaced from the hinge pivot. The three rollers are adapted to engage within guide or cam slots which are formed in a supporting plate attached to the fixed frame of the chair and which comprise a vertical slot adjacent the rear end of the plate, an inclined slot preferably continuous with the lower end of said vertical slot and extending forwardly and downwardly at an angle of about 45° to the horizontal, and a third slot adjacent the forward end of the plate and extending substantially horizontally. In use, the pivot or hinge pin roller engages the inclined slot, the back supported roller engages the vertical slot whilst the seat supported roller engages the horizontal slot, and when the chair back is in a substantially erect position the first two of said rollers are located at the upper ends of their respective slots whilst the third of said rollers is located at the rear end of the horizontal slot. Thus when the seat is tilted rearwardly, it also moves downwardly by reason of the pivot pin roller riding in the inclined slot and so, in turn, the rear end of the seat is depressed, tilting the seat around the roller in the horizontal slot. A forward movement of the seat is also obtained. It will be seen, therefore, that the spacing of the back and seat supported rollers from the hinge pin roller and the angular disposition of the slots determines the relative angular movements of the seat and back and thus by appropriate selection of these factors any desired relative seat and back movements can be secured in a simple but effective manner.

With the arrangement described, it has been found that the frictional engagement of the rollers in the slots under the weight of an occupant of the chair is sufficient to retain the seat and back in any intermediate position of tilt, but, if desired, additional frictional or other means may be provided for positively retaining the chair in an adjusted position.

The chair may be provided with a folding foot-rest of either of the forms disclosed in Applications Nos. 7576/55 and 28528/55,

(Serial No. 788,095) the link attached to the curved lever arm carrying the footrest being in this instance attached to one end of a double arm lever pivoted on the side edge of the seat with the other end of said lever linked to the fixed supporting plate so that forward move-

ment of the seat rocks the double-armed lever to swing the footrest to the operative position.

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PROVISIONAL SPECIFICATION  
No. 5542, A.D. 1956.

Improvements in or relating to Reclining Chairs

We, RESEARCH INTERESTS LIMITED, a 10 British Company, of 79, Davies Street, London, W.1, do hereby declare this invention to be described in the following statement:—

This invention relates to reclining chairs in 15 which a tilting back and a tilting seat are interconnected in a manner such that the front end of the seat rises automatically as the back is tilted rearwardly.

Heretofore, in chairs of this kind, relatively 20 complicated linkage has been used to secure the required relative movement of the seat and back, which linkage was not only costly but when applied to an open chair, was usually visible beneath the seat and was 25 thus detrimental to the appearance of the chair. The object of the present invention is to provide an improved action or mechanism which is of extremely simple construction, which is invisible in use and yet which permits any desired relationship to be obtained 30 between the tilting movements of the seat and the back within the limits of the mechanism.

According to the invention the chair back 35 is pivotally connected at its lower end to the rear end of the chair seat such that the seat is moved forwardly as the back tilts rearwardly, the seat having towards its forward end a pin or roller and slot connection, or a swinging 40 link connection, with the fixed side rail of the chair such that the front end of the seat rises as the seat moves forward, and the mechanism being contained wholly or substantially within the limits of the said fixed side rail 45 so as to be concealed thereby.

The invention will be more fully understood from the following description of the 50 two embodiments thereof illustrated in the accompanying drawings, said two embodiments being shown respectively in Figs. 1 and 2.

In practice, the action or mechanism is 55 duplicated, one being disposed at each side of the chair, but as the two actions are similar only one need be described. Referring first to Fig. 1, the chair back 1 is attached at its lower end to an extension 2a of a rectangular metal plate 2 which is pivoted at 3 to the rear end of the fixed rail 4 of the chair. Pivotally 60 attached to the plate 2 at a point 5, that is, at a point below and rearward of the pivot 3, is one end of a metal strip 6 which is attached

to the side edge of the chair seat and extends substantially horizontally when the chair seat is in the fully lowered position. At its forward end the strip 6 carries a pin or roller 7 which rides in an inclined slot 8 formed in a metal plate 9 attached to the fixed side rail 4. Thus when the back 2 is tilted rearwardly, the seat, by reason of the relative disposition of pivots 3 and 5 is moved forwardly but at the same time the pin and slot connection 7, 8 is effective to raise the forward end of the seat, and it will be seen that the angle of inclination of the slot 8 determines the degree of tilt of the seat for a given displacement of the back.

A further advantage of this construction is that the weight of an occupant of the chair acting downwardly creates friction between the pin and the slot and this frictional engagement is sufficient to retain the seat and back in any desired intermediate position of tilt. Where, however, the frictional resistance of the pin to movement is excessive such as to necessitate undue effort to adjust the seat and back, a roller may be fitted over the pin so that only the friction between the pin and the roller need then be overcome to effect adjustment.

The back 1 may be attached to the plate extension 2a in any suitable manner but in the preferred arrangement the frame of the chair back is slotted at the sides as indicated at 10 to slide down over the extensions 2a and is fixed thereto by screws or the like inserted from the rear before the covering on the rear side of the back is fixed in position.

If desired, the metal strip 6 may be dispensed with, the side rail of the seat being pivoted directly to the plate 2 and carrying the pin or roller 7. The use of a metal strip is, however, preferred and it may be of angle section for strength, one web of the strip being recessed into the seat side rail so that the strip occupies the minimum of space between the seat and the frame.

As an alternative to the pin and slot 7, 8, a swinging link 11 may be used pivotally attached at its ends to the strip 6 and to a bracket on the rail 4 respectively and positioned as shown in the drawing so as to lift the seat as it moves forward. With such a link, separate frictional means will need to be provided to hold the seat and back in a desired adjusted position and such means may be of

any suitable type and may, if desired, be embodied in an adjustable footrest operated by the seat and back control mechanism.

5 Fig. 2 shows a second embodiment using a different form of connection between the seat and the back. As shown, a metal plate 12 is attached to the fixed side rail 4 and has a vertical slot 13 and an inclined slot 14, preferably continuous, formed therein. A pivot 10 pin 15 connects the rear end of the strip 6 and the lower end of a strip 16 on to which the back 1 is slotted or otherwise attached, said pin projecting laterally and carrying a roller which rides in the inclined slot 14. A 15 second pin or roller 17 carried by the strip 16 rides in the vertical slot 13 and it will be seen that when the back is tilted rearwardly from the position shown in the drawing, the rollers ride down their slots whereby the seat 20 is displaced forwardly and at the same time

the rear end of the seat is depressed, and the degree of displacement and depression is determined by the angular disposition of the slot 14. The front end of the seat is supported and guided by the pin and slot mechanism or the swinging link as described with reference to Fig. 1 but as the pin and slot device 15, 14 also provides frictional control of tilting movement, this mechanism is particularly adapted for use with the swinging link front end support.

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The chair may be provided with a folding footrest or legrest of any suitable type and such footrest may for example, be of one of the forms disclosed in our co-pending Application No. 1132/56 (Serial No. 788,095).

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Published at the Patent Office, 25, Southampton Buildings, London, W.C.2, from which  
copies may be obtained.

794,138 PROVISIONAL SPECIFICATION N° 5542<sup>56</sup>

1 SHEET

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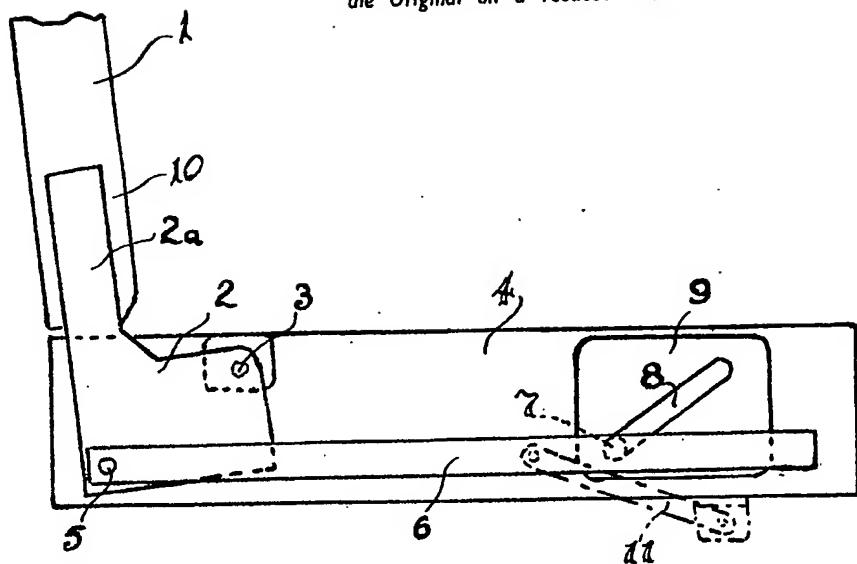


FIG. 1.

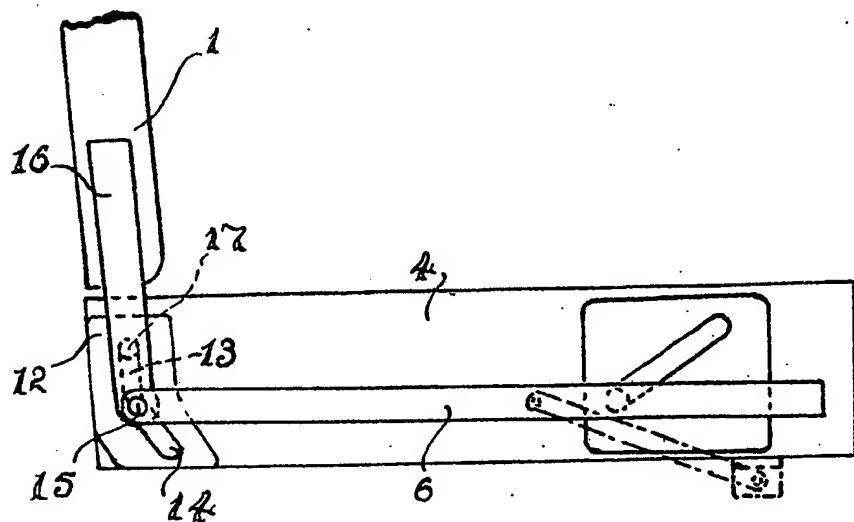
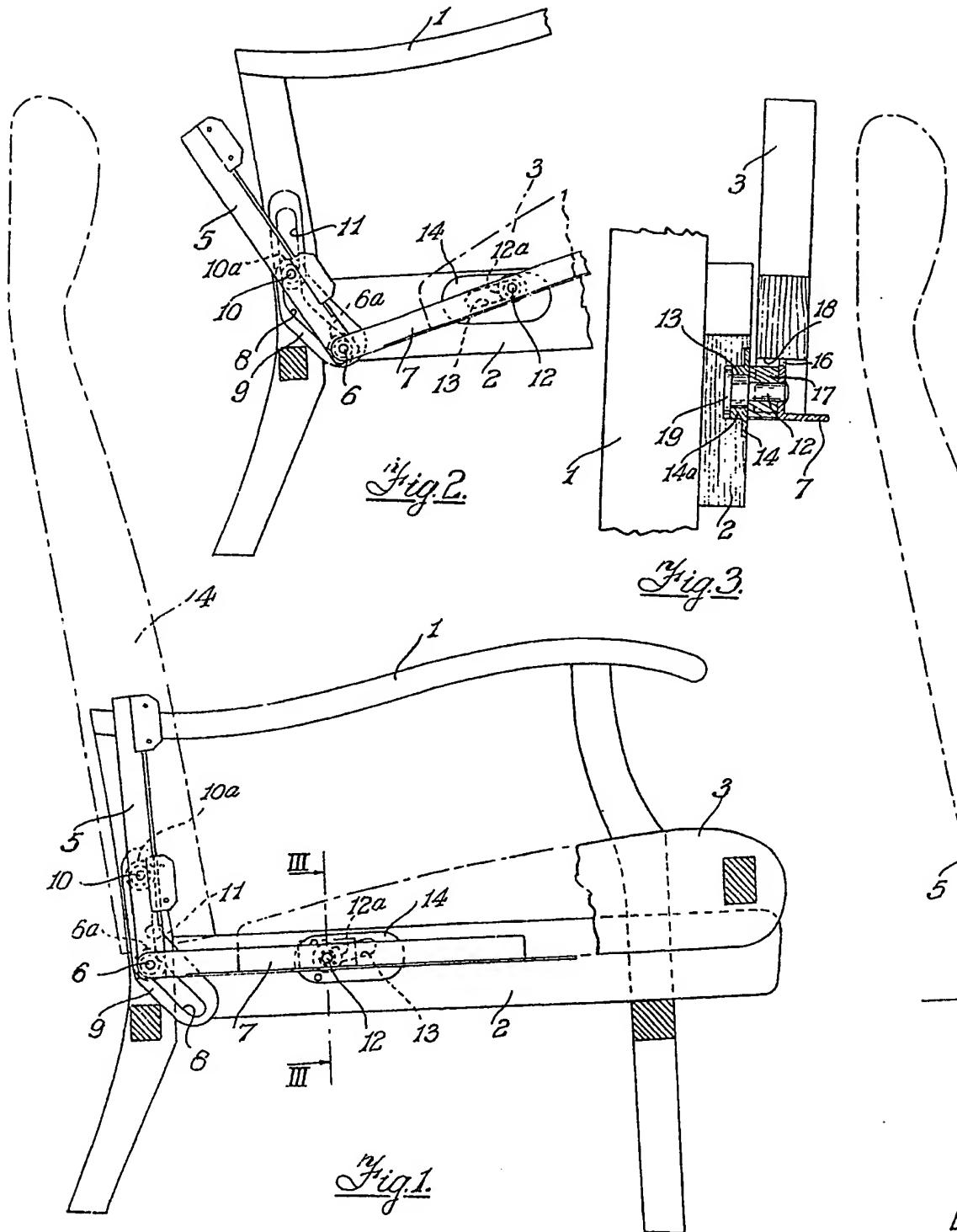


FIG. 2.

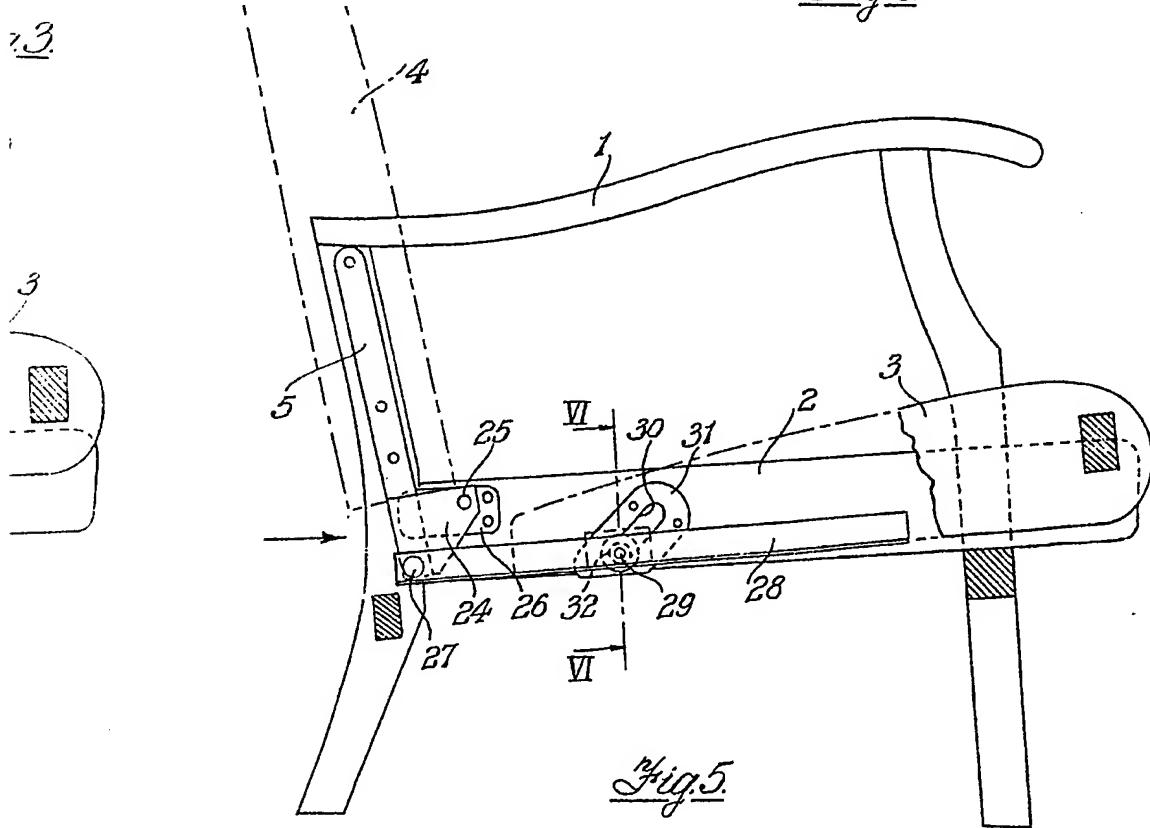
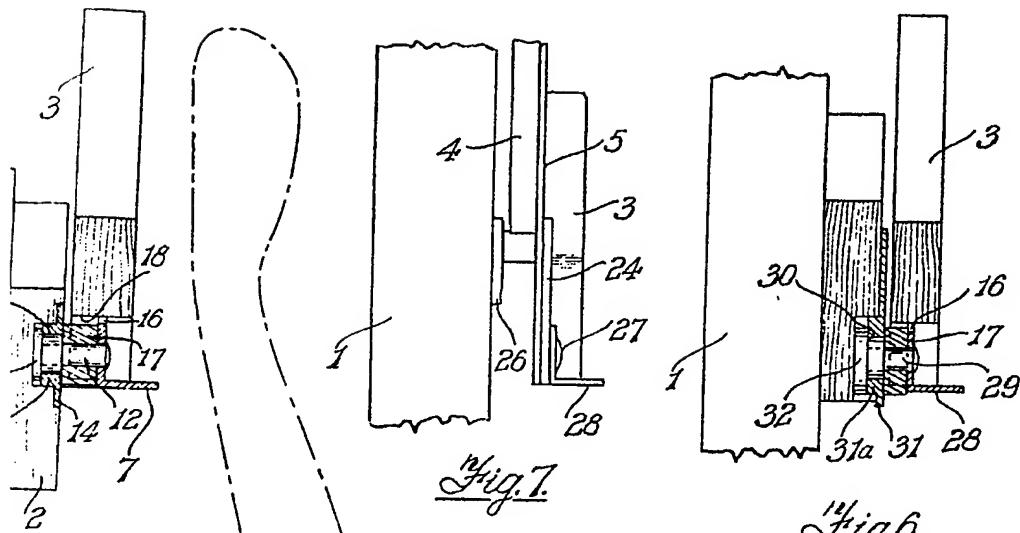


794,138 COMPLETE SPECIFICATION

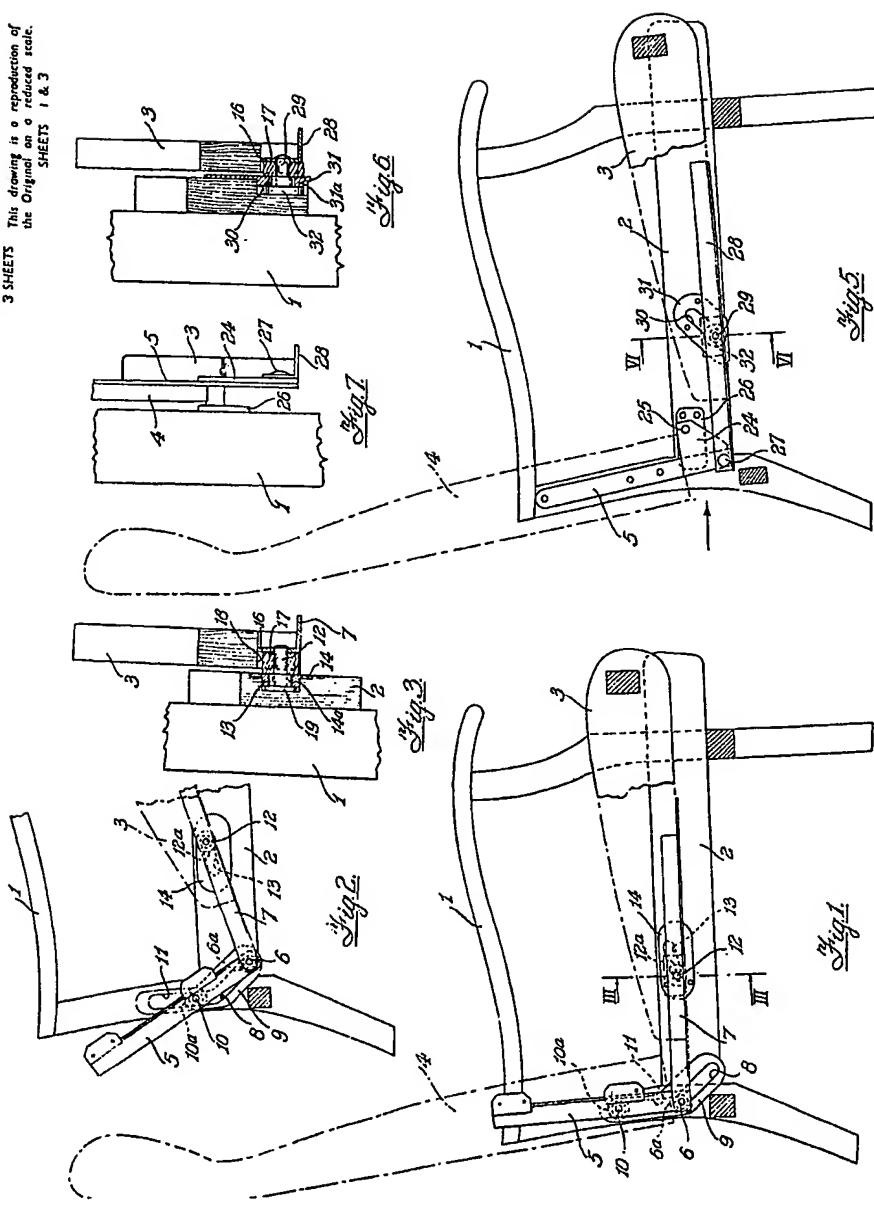
3 SHEETS

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SHEETS 1 & 3



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SHEETS 1 & 3



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SHEET 2

